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STUDY OF SYNCHROTRON RADIATION FROM WET ELECTRODE
SURFACES(U) IBM RESEARCH LAB SAN JOSE CA L BLUM ET AL.
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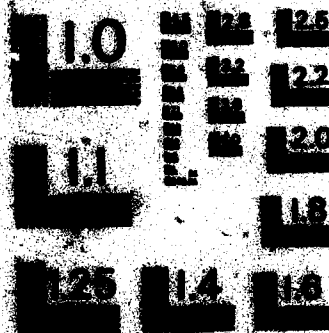
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END OF YEAR REPORT

STUDY OF SYNCHROTRON RADIATION FROM WET ELECTRODE
SURFACES

OFFICE OF NAVAL RESEARCH
CONTRACT N 00014-82-C-0076
TASK NO. NR 051-775

PRINCIPAL INVESTIGATORS

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FUNDING HISTORY

October 1, 1981 - September 30, 1982
\$115,551

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2) DESCRIPTION OF THE PROJECT

EXAFS spectra of halide ions adsorbed on Cu and Ag will be acquired to determine the site geometry of the adsorbed ion. In order to achieve sufficiently high sensitivity, the x-ray fluorescence emitted by the absorbing atom will be detected. Discrimination between surface and solution species will be achieved in one of two ways: by modulating the adsorption and subtracting the low coverage spectrum from the high coverage, or by removing the electrode from solution in such a way that a very thin layer of electrolyte remains on the surface.

3) SIGNIFICANT RESULTS

The final form of the agreements between UPR, ONR and IBM were signed in May, 1982; producing further delays in the effective start of the experimental part of our project. Nevertheless, a proposal was submitted for request of time at the accelerator in Stanford, and the apparatus construction is well under way in San José, (IBM).

Theoretical calculations of a molecular model of the electric double layers showed a layered structure of the solvent molecules, while the differential capacitance has a rather smooth appearance.

We also got exact results for the pair distribution function near flat and non-flat surfaces. In the latter case we showed that the distribution has no finite multi



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pole moments. These theorems should be very useful in constructing theories for the primitive and non-primitive models of the electric double layer.

4) SUMMARY OF PLANS

EXPERIMENTAL: Initial experiments will be carried out at Stanford, hopefully in October, November, 1982.

THEORETICAL: Models for liquid metal-ionic solution interfaces are being explored. Specifically, the metal is represented by a jellium model, and the solution by a ion-dipole mixture. Work on integral equations for molecular solutions and exact theorems is going to be continued.

5) GRADUATE STUDENTS AND POST DOCTORAL ASSOCIATES

Dr. Kathryn Bunting, Post Doctoral, Started July, 1982.

6) PUBLICATIONS AND DISSERTATIONS

PUBLICATIONS:

1. . Henderson and L. Blum, "The Interfacial Structure of a Mixture of Charged Hard Spheres and Dipolar Hard Spheres Near a Charged Wall", Discussions of the Faraday Society, No. 16, (1981).
2. L. Blum, C. Gruber, J. Lebowitz and P. Martin, "On Perfect Screening in Charged Systems", Phys. Revs. Letters, (1982).
3. F. Vericat, L. Blum and . Henderson, "Non-primitive Electrolyte Near a Charged Wall: Generalized Mean Spherical Approximation", Logan Conference, to be published in
4. L. B. Shuiyan, L. Blum and . Henderson, "The Application of the Modified Gudy-Chapman Theory to an Electric Double Layer Containing Asymmetric Ions", J. Electroanalytical Chemistry.

DISSERTATIONS

1. Rutgers Meeting, May 1982, "Perfect Screening", Rutgers University.
2. "Sum Rules and Integral Equations", July 16, 1982, National Bureau of Standards.
3. Same Title, July 23, 1982, Guelph University, Canada.
4. Same Title, August 17, 1982, University of Trieste, Italy.

7. AWARDS AND HONORS

None.